REMARKS

Claims 1-20 are pending herein.

Claims 1-20 are rejected.

Claim Rejections under 35 U.S.C. 103

Claims 1-10 and 12 were rejected under 35 U.S.C. 103(a) as being unpatentable over Okudaira et al. (U.S. Pat. No. 5,705,029) in view of Koshimizu et al. (U.S. 2005/0172904).

It is respectfully submitted that Okudaira et al. in view of Koshimizu et al. fails to render claims 1- 10 obvious within the contemplation of 35 U.S.C. 103(a), as will be hereinafter set forth.

Okudaira et al. in view of Koshimizu et al. fails to teach invention of claims 1-8

It is respectfully submitted that Okudaira et al. in view of Koshimizu et al. fails to teach or suggest a method comprising "...*circulating* a main coolant fluid...through [a] substrate support; and *circulating* a compensation coolant fluid...through the substrate support upon [a] rise in temperature of [a] chamber", as set forth in claim 1, and therefore, defined by claims 2-8 as dependent from claim 1.

The New Webster's Dictionary of the English Language defines "circulate" as "to move in a circle; to move around and return to the same point...".

It is respectfully submitted that Okudaira et al. teaches that a main cooling fluid (cooling gas) is discharged from the substrate support at the backside of a wafer (2), as shown in Fig. 3 of Okudaira et al., rather than being circulated through the circulate support, as required by claims 1-8 of the present application.

Koshimizu et al. et al. teaches an apparatus having a chuck (108). As shown in

Fig. 1 of Koshimizu et al, first and second gas supply ducts (114, 116) extend from a helium source (138), through the chuck 108 and discharge at the backside of a wafer (W) resting on the chuck. Therefore, while it teaches *transporting* a gas through the chuck (108) and *discharging* the gas at the wafer backside, Koshimizu fails to teach or suggest "...*circulating* a main coolant fluid...through [a] substrate support; and *circulating* a compensation coolant fluid...through the substrate support", as set forth in claim 1, and therefore, defined by claims 2-8 as dependent therefrom.

It is further respectfully submitted that neither Okudaira et al. nor Koshimizu et al. contemplates initially cooling a substrate support by circulating a main coolant through the substrate support, anticipating an additional rise in temperature of the substrate support and counteracting this additional rise in temperature by circulating a compensation coolant through the substrate support, as set forth in claim 1 and defined by claims 2-8 as dependent therefrom.

It is noted that Okudaira et al teaches a substrate support (3) adapted to contain a cooling medium (6) and a conduit (11) adapted to distribute a cooling gas to the surface of the substrate support (3). However, Okudaira et al. sets forth neither the order in which the cooling medium and the cooling gas are applied to the substrate support (3) nor the reason why such order would be important.

Therefore, it is respectfully submitted that Okudaira et al. in view of Koshimizu et al. fails to render claims 1-8 under 35 U.S.C. 103(a). Reconsideration and allowance of claims 1-8 is therefore respectfully solicited.

Okudaira et al. in view of Koshimizu et al. fails to teach invention of claims 9, 10 and 12

It is respectfully submitted that Okudaira et al. in view of Koshimizu et al. fails to teach or suggest a method comprising "...*circulating* a main coolant through...[a]

substrate support at the set point temperature...*circulating* [a] compensation coolant fluid...through...the substrate support at a cooling temperature lower than said set point temperature", as set forth in claim 9, and therefore, defined by claims 10 and 12, for the same reasons as were set forth hereinabove with respect to the rejection of claims 1-8.

Furthermore, it is respectfully submitted that neither Okudaira et al. nor Koshimizu et al contemplates initially cooling a substrate support by circulating a main coolant through the substrate support, anticipating an additional rise in temperature of the substrate support and counteracting this additional rise in temperature by circulating a compensation coolant through the substrate support, as set forth in claim 9 and defined by claims 10 and 12 as dependent therefrom.

Therefore, it is respectfully submitted that Okudaira et al in view of Koshimizu et al fails to render claims 9, 10 and 12 obvious under 35 U.S.C. 103(a). Reconsideration and allowance of claims 9, 10 and 12 is therefore respectfully solicited.

Claims 1, 9-12 and 15 were rejected under 35 U.S.C. 103(a) as being unpatentable over Nagaiwa et al. (U.S. Pat. No. 6,723,202) in view of Koshimizu et al. (U.S. 2005/0172904).

It is respectfully submitted that Nagaiwa et al. in view of Koshimizu et al. fails to render claims 1, 9-12 and 15 obvious under 35 U.S.C. 103(a), as will be set forth herein below.

Nagaiwa et al in view of Koshimizu et al. fails to teach invention of claim 1

It is respectfully submitted that Nagaiwa et al. fails to teach or suggest a method comprising "...*circulating* a main coolant fluid...through [a] substrate support; and *circulating* a compensation coolant fluid...through the substrate support upon [a] rise in

temperature of [a] chamber", as set forth in claim 1.

In contrast, Nagaiwa et al. teaches distributing a coolant through a coolant flow path (reference numeral 11C in the Nagaiwa et al. patent) in addition to distributing a *heat transfer medium gas* through a gas passage (9) and discharging the heat transfer medium gas against the backside of a wafer (W), as set forth in col. 4, lines 21-30 of Nagaiwa et al., to increase the heat transfer properties between a worktable (6) and a wafer (W). Therefore, the heat transfer medium gas distributed through the gas passage (9) merely enhances the cooling effectiveness of the coolant flowing through the coolant flow path (11C).

Furthermore, as was set forth herein above, Koshimizu fails to teach or suggest "...*circulating* a main coolant fluid...through [a] substrate support; and *circulating* a compensation coolant fluid...through the substrate support", as set forth in claim 1.

Moreover, neither Nagaiwa et al nor Koshimizu et al contemplates initially cooling a substrate support by circulating a main coolant through the substrate support, anticipating an additional rise in temperature of the substrate support and counteracting this additional rise in temperature by circulating a compensation coolant through the substrate support, as set forth in claim 1.

Therefore, it is respectfully submitted that Nagaiwa et al in view of Koshimizu et al fails to render claim 1 obvious under 35 U.S.C. 103(a). Reconsideration and allowance of claim 1 is therefore respectfully solicited.

Nagaiwa et al in view of Koshimizu et al. fails to teach invention of claims 9-12 and 15

It is respectfully submitted that Nagaiwa et al. in view of Koshimizu et al. fails to teach or suggest a method comprising "...circulating a main *coolant* through...[a] substrate support at [a] set point temperature...circulating [a] compensation *coolant*

fluid...through...the substrate support at a cooling temperature lower than said set point temperature upon [a] rise in temperature of the substrate support above the set point temperature", as set forth in claim 9, and therefore, defined by claims 10-12 and 15 as dependent from claim 9, for the same reasons as were set forth with respect to the rejection of claim 1.

Therefore, it is respectfully submitted that Nagaiwa et al in view of Koshimizu et al fails to render claim 9, and claims 10-12 and 15 as dependent from claim 9, under 35 U.S.C. 103(a). Reconsideration and allowance of claims 9-12 and 15 is therefore respectfully solicited.

Claims 7 and 11 were rejected under 35 U.S.C. 103(a) as being unpatentable over Okudaira et al. or Nagaiwa et al. in view of Koshimizu as applied above, in further view of Hideo et al. (JP 2003-248322).

It is respectfully submitted that Okudaira et al. or Nagaiwa et al. in view of Koshimizu and in further view of Hideo et al. fails to render claims 7 and 11 under 35 U.S.C. 103(a), as will be hereinafter set forth.

Okudaira et al. or Nagaiwa et al. in view of Koshimizu and Hideo et al. fails to teach invention of claim 7

Claim 7 depends from claim 1, and therefore, incorporates all of the limitations of claim 1.

As was set forth herein above, neither Okudaira et al. in view of Koshimizu et al. nor Nagaiwa et al. in view of Koshimizu et al. teaches or suggests all of the limitations of claim 1, and therefore, claim 7 as dependent from amended claim 1.

It is respectfully submitted that Hideo et al. fails to teach or suggest a method

comprising "...*circulating* a main *coolant* fluid...through [a] substrate support; and *circulating* a compensation *coolant* fluid...through the substrate support...", as set forth in claim 1, and therefore, defined by claim 7 as dependent from claim 1.

It is further respectfully submitted that Hideo et al. fails to contemplate initially cooling a substrate support by circulating a main coolant through the substrate support, anticipating an additional rise in temperature of the substrate support and counteracting this additional rise in temperature by circulating a compensation coolant through the substrate support, as set forth in claim 1, and therefore, defined by claim 7 as dependent therefrom.

Therefore, it is respectfully submitted that Okudaira et al. or Nagaiwa et al. in view of Koshimizu et al. and in further view of Hideo et al. fails to render claim 7, as dependent from claim 1, under 35 U.S.C. 103(a). Reconsideration and allowance of claim 7 is therefore respectfully solicited.

Okudaira et al. or Nagaiwa et al. in view of Hideo et al. fails to teach invention of claim 11

Claim 11 depends from claim 9, and therefore, incorporates all of the limitations of claim 9.

It is respectfully submitted that Okudaira et al. or Nagaiwa et al. in view of Koshimizu et al. and further in view of Hideo et al. fails to teach or suggest a method comprising "...*circulating* a main *coolant* through...[a] substrate support at the set point temperature...*circulating* [a] compensation *coolant* fluid...through...the substrate support at a cooling temperature lower than said set point temperature upon [a] rise in temperature of the substrate support above the set point temperature", as set forth in claim 9, and therefore, defined by claim 11 as dependent therefrom, for the same

reasons as were set forth hereinabove with respect to the rejection of claim 7.

Therefore, it is respectfully submitted that Okudaira et al. or Nagaiwa et al. in view of Koshimizu et al. and in further view of Hideo et al. fails to render claim 11, as dependent from claim 9, under 35 U.S.C. 103(a). Reconsideration and allowance of claim 11 is therefore respectfully solicited.

Claim 16 was rejected under 35 U.S.C. 103(a) as being unpatentable over Nagaiwa et al. in view of Koshimizu et al., as applied above, and in further view of Okudaira et al.

Claim 16 depends from claim 9, and therefore, incorporates all of the limitations of claim 9.

As was set forth herein above, Nagaiwa et al. in view of Koshimizu et al. fails to teach or suggest the limitations of claim 9, and therefore, claim 16 as dependent therefrom.

It is respectfully submitted that Okudaira et al. fails to teach or suggest a method comprising "...*circulating* a main *coolant* through...[a] substrate support at the set point temperature...*circulating* [a] compensation *coolant* fluid...through...the substrate support at a cooling temperature lower than said set point temperature upon [a] rise in temperature of the substrate support above the set point temperature", as set forth in claim 9, and therefore, defined by claim 16 as dependent therefrom.

In contrast, Okudaira et al. teaches that a main cooling fluid (cooling gas) is discharged from a substrate support (3) at the backside of a wafer (2), as shown in Fig. 3 of Okudaira et al., rather than being circulated through the circulate support, as required by claim 9 of the present application and claim 16 as dependent therefrom.

Furthermore, Okudaira et al. fails to contemplate initially cooling a substrate

support by circulating a main coolant through the substrate support, anticipating an additional rise in temperature of the substrate support and counteracting this additional rise in temperature by circulating a compensation coolant through the substrate support, as set forth in claim 9, and therefore, defined by claim 16 as dependent therefrom.

Therefore, it is respectfully submitted that Nagaiwa et al. in view of Koshimizu et al. and in further view of Okudaira et al. fails to teach or suggest the limitations of claim 9, and therefore, claim 16 as dependent therefrom.

Accordingly, it is respectfully submitted that Nagaiwa et al. in view of Koshimizu et al. and further in view of Okudaira et al. fails to render claim 16, as dependent from claim 9, obvious under 35 U.S.C. 103(a). Reconsideration and allowance of claim 16 is therefore respectfully solicited.

Claims 13, 14 and 17-20 were rejected under 35 U.S.C. 103(a) as being unpatentable over Nagaiwa et al. or Okudaira et al. in view of Koshimizu et al., as applied above, in view of Long et al. (U.S. Pat. No. 6,608,352).

It is respectfully submitted that Nagaiwa et al. or Okudaira et al. in view of Koshimizu et al. and in view of Long et al. fails to render claims 13, 14 and 17-20 under 35 U.S.C. 103(a), as will be hereinafter set forth.

Nagaiwa et al. or Okudaira et al. in view of Koshimizu et al. and in further view of Long et al. fails to teach invention of claims 13 and 14

Claims 13 and 14 depend from claim 9, and therefore, incorporate all of the limitations of claim 9.

As was set forth herein above, neither Nagaiwa et al. nor Okudaira et al. in view of Koshimizu et al. teaches or suggest all of the limitations of claim 9, and therefore,

claims 13 and 14 as dependent from claim 9.

Long et al. fails to teach or suggest a method comprising "...circulating a main coolant through...[a] substrate support at [a] set point temperature...circulating [a] compensation coolant fluid...through...the substrate support at a cooling temperature lower than said set point temperature upon [a] rise in temperature of the substrate support above the set point temperature", as set forth in claim 9, and therefore, defined by claims 13 and 14 as dependent therefrom.

Therefore, it is respectfully submitted that Long et al. would fail to provide any teaching, suggestion or motivation to a person of ordinary skill in the art to modify the method of Nagaiwa et al. or Okudaira et al. in the manner required by the limitations of claims 13 and 14.

While Long et al. teaches use of a p/n junction to measure the thermal resistance (resistance to change in temperature) of a field effect transistor, it is respectfully submitted that Long et al. fails to teach or suggest adapting a P/N junction in such a manner as to sense a temperature of a substrate support and control flow of a compensation coolant through the substrate support by operation of the P/N junction, as required by claims 13 and 14.

Furthermore, it is respectfully submitted that Long et al. fails to contemplate initially cooling a substrate support by circulating a main coolant through the substrate support, anticipating an additional rise in temperature of the substrate support and counteracting this additional rise in temperature by circulating a compensation coolant through the substrate support, as set forth in claim 9, and therefore, defined by claims 13 and 14 as dependent therefrom.

Accordingly, it is respectfully submitted that Nagaiwa et al. or Okudaira et al. in view of Koshimizu et al. and in further view of Long et al. fails to render claims 13 and

14 obvious under 35 U.S.C. 103(a). Reconsideration and allowance of claims 13 and 14 is therefore respectfully solicited.

Nagaiwa et al. or Okudaira et al. in view of Koshimizu et al. and in further view of Long et al. fails to teach invention of claims 17-20

It is respectfully submitted that Nagaiwa et al. or Okudaira et al. in view of Koshimizu et al. fails to teach or suggest a method of maintaining a substrate support at a set point temperature in a reaction chamber upon a rise in temperature of the chamber, comprising "...operating [a] reaction chamber and [a] main coolant chamber...maintaining [a] substrate support at [a] set point temperature by operating [a] compensation coolant chamber in accordance with [a] temperature compensation characteristic curve", as set forth in claim 17, and therefore, claims 18-20 as dependent therefrom.

It is further respectfully submitted that Long et al. fails to teach or suggest a method having all of the limitations set forth in claim 17, and therefore, claims 18-20 as dependent therefrom. In the Office action, it was stated, "Regarding claim 17: A main temperature characteristic curve is seen in Fig. 5. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to modify the method of Nagaiwa et al. or Okudaira et al. as modified by Koshimizu et al to provide a pn junction module to determine the thermal resistance of the substrate and thus enhance process control".

However, it is respectfully submitted that Fig. 5 of Long et al. is a current versus temperature characteristic curve of a pn junction, rather than a main temperature characteristic curve or a temperature compensation characteristic curve of a substrate support in a reaction chamber, as set forth in claim 17.

While Long et al. teaches the use of a P/N junction to determine the thermal resistance (resistance in change of temperature) of a field effect transistor, Okudaira et al., Nagaiwa et al. and Koshimizu et al., taken alone or in combination with each other, fail to teach or suggest modifying the P/N junction of Long et al. in such a manner as to "maintain a substrate support at a set point temperature in a reaction chamber upon a rise in temperature of the chamber", as set forth in claims 17-20.

It is further respectfully submitted that none of the patents to Nagaiwa et al., Okudaira et al., Koshimizu et al. or Long et al., contemplates the problem of maintaining a substrate support at a set point temperature in a reaction chamber, anticipating an additional rise in temperature of the substrate support and counteracting this additional rise in temperature by operating a compensation coolant chamber in accordance with a temperature compensation characteristic curve, as set forth in claim 17 and defined by claims 18-20 as dependent therefrom.

Accordingly, it is respectfully submitted that Nagaiwa et al. or Okudaira et al. in view of Koshimizu et al. and in further view of Long et al. fails to render claims 17-20 obvious under 35 U.S.C. 103(a). Reconsideration and allowance of claims 17-20 is therefore respectfully solicited.

Conclusion

Every effort has been made to amend applicant's claims in order to define his invention in the scope to which it is entitled. Accordingly, reconsideration and allowance of claims 1-20 is respectfully solicited.

Respectfully submitted,

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